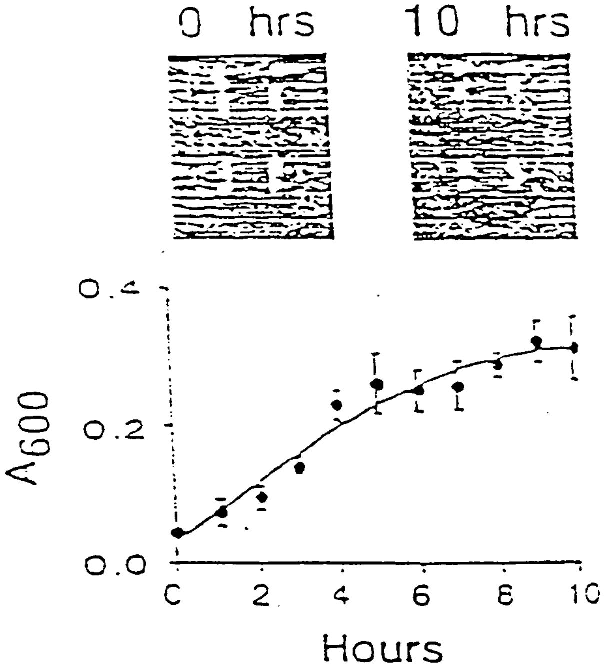

FIG. 1

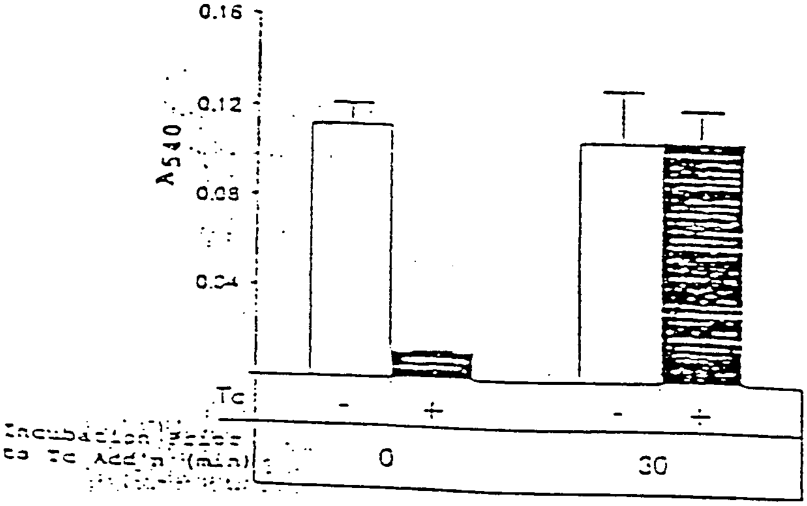

FIG. 2

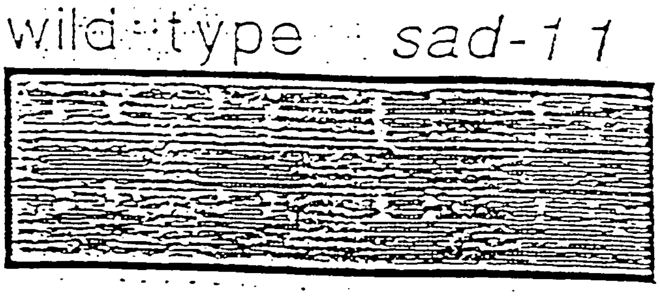
wild-type
sad-1 1

FIG. 3

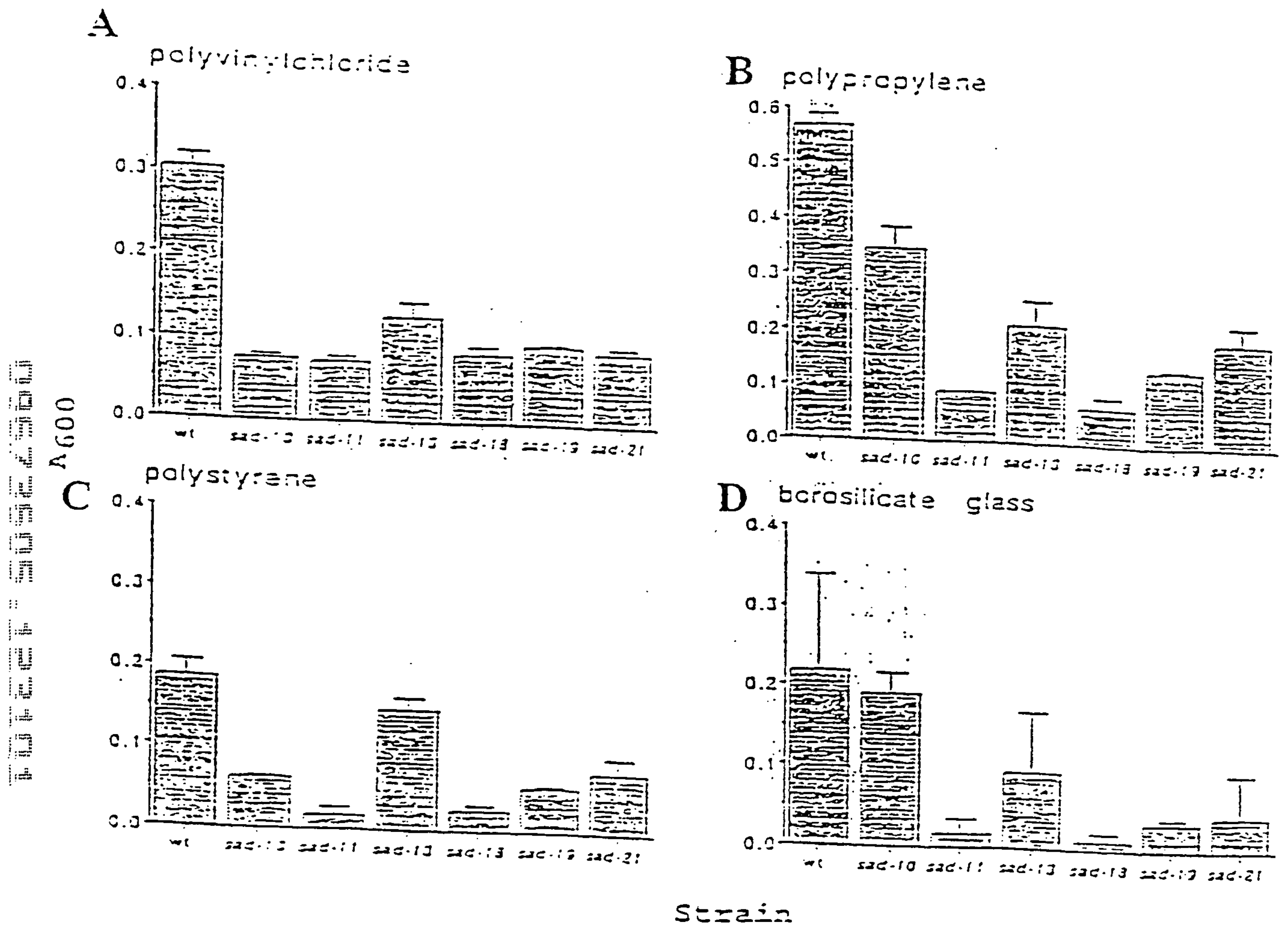
A
polyvinylchloride
0.4
0.3
0.2
0.1
0.0
wt
sad-10
sad-11
sad-13
sad-18
sad-19
sad-21
B
polypropylene
0.6
0.5
0.4
0.3
0.2
0.1
0.0
wt
sad-10
sad-11
sad-13
sad-18
sad-19
sad-21
C
polystyrene
0.4
0.3
0.2
0.1
0.0
wt
sad-10
sad-11
sad-13
sad-18
sad-19
sad-21
D
borosilicate glass
0.4
0.3
0.2
0.1
0.0
wt
sad-10
sad-11
sad-13
sad-18
sad-19
sad-21
A600
Strain

Fig. 4

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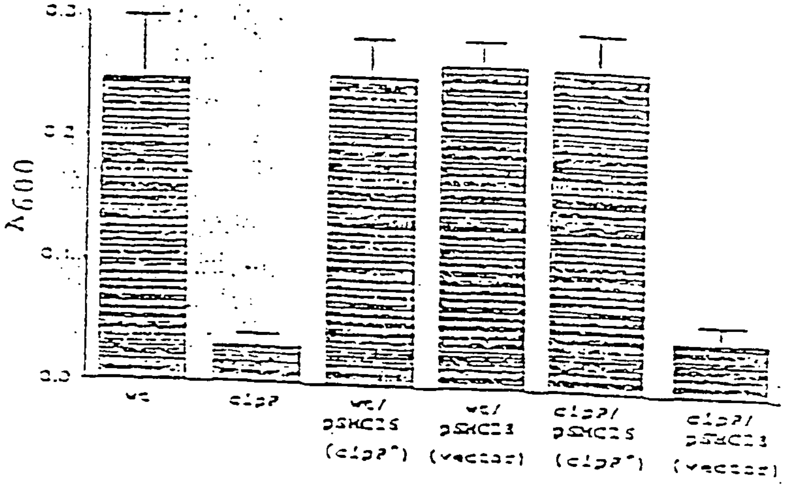

Fig. 5

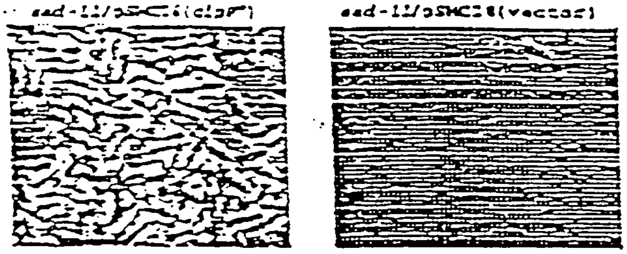
aad-11/pSMC18(clpP)
aad-11/pSMC18(vector)

Fig. 6

09673605 .102401

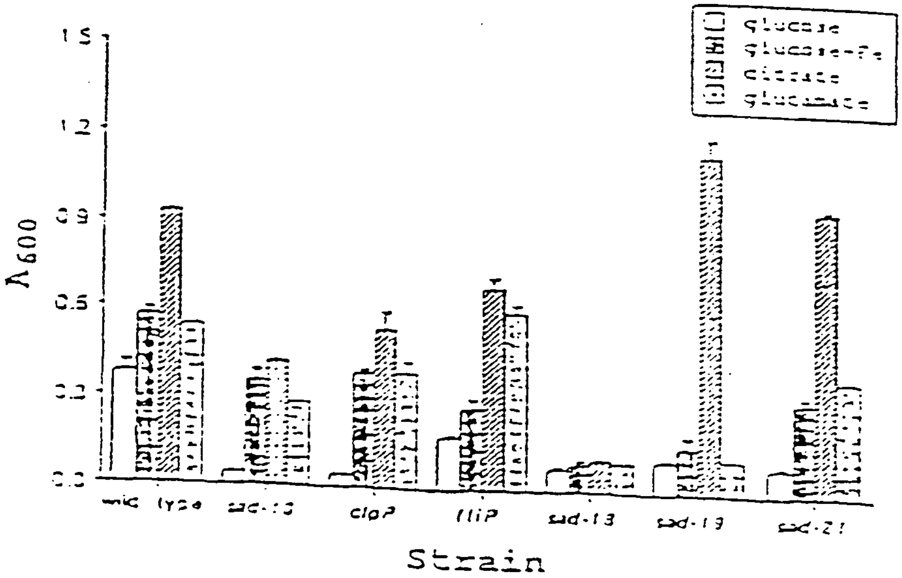

Fig. 7

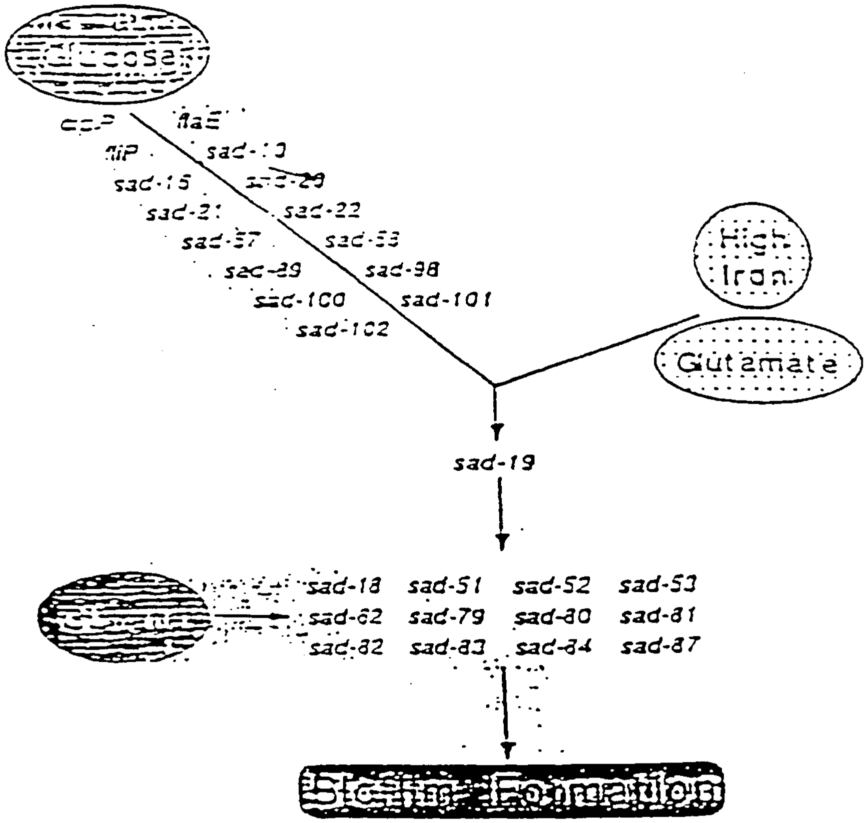
Glucose
crp
flaE
fliP
sad-10
sad-15
sad-29
sad-21
sad-22
sad-37
sad-33
sad-29
sad-98
sad-100
sad-101
sad-102
High Iron
Glutamate
sad-19
sad-18
sad-51
sad-52
sad-53
sad-62
sad-79
sad-80
sad-81
sad-82
sad-83
sad-84
sad-87
Biofilm Formation

Fig. 8

sac-13 **SEQ ID NO: 4**

```
GATGGG
TCGGTNACTCGGTCACGCCTGGGGTGGTGCTCGGAACAGGTTCTCGAAGTTGCCGCCAGTGGCGT
ATCGATGCTGACTTCAACTTTGCCGCCGTCTTTGTAGACGTCGTCTTTTGGTGCGTCGACAGTCA
CGGTGCCGGTGGTGGCGCCCGCAGCGATGTTGATCACCGCGCCGTTGCTCAGGGTCACAGTGACA
GGCGAGCCCGGCGGCGTTGGTCAAGGTTGCGGTGTAAACGATCGAACCGCCTTCGGCAACGCTATC
GGTTGCACTCAAAGTCAGGCCGGTAGTGTCCTGAATGTCTGTNANNGTGGTGTCNGCCGGGGTGG
CGTCCANGTCCAATATTTCATAATTNCNACCNTGGGGTCCTCCANNTTTNANNCTCAAGTTATCGC
CCCCCCCCCAAAGGCTCCTTTNGCGTNACNAAATTCACCGANNCCGANCTGGCNCCNAACCGGAAN
GGTGANGGTCTGGGCCGGTTCNAACANGGTNNATAACCAAACGGAACNTCGGGTCACCGGTTTCN
TTTAACNGAAGGNGGTGTTNNAACCNCGGNCCCNNCTTCCGGGCCAANGNGNGAAATTNNCNGGTG
GGNGGAAAANAGGTCNANGTTTTNAANGGGTTCCNGTNANCNTCNTNNNCCCCNANGGNTTNT
TNNTNANAAACCAAANNTCNCCNGAATTTNCCNCCNGGTNGGNTTTTNNCNGNANNNNGGAANTT
NNNGGGTGGGNNNNNCCNNTCCTTTGTTTNAAAATNANNCNTTTTNGGGNCCNNNNNCNAAAAGGG
NCANNNGNGGNCCNNNTGGGNNGGNNNCCNNNGGGNCCNAAGNTTTTNAAANAAANNNNNCCCGN
NNGGNNNNNNNGGTNNNNNGNNNNNNNGGNNAAACCCCNGNNNNNNNTTNNGGNNNNNNGGGNG
GNNNNGNTTTNANAAAAAAACC
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sad-13 **SEQ ID NO: 5**

CNCAANGGCNCAGAGCACAGGATATGCNGCAATCTCATGGACAAACGGCGCCAGCCCNATGGAG
GCCACCGACNCCACATCCGTCCGCCCCGGTCGCTTGCAGGCNCGCCAACGCANCCTCAAGGTTCTG
CGCCANTTGCANCNCTNCCTCGGNCACCANCCNNAGTTGCCAGCNCCNCAAACTCCCCACCNCNA
ANNCNCNTNACNAAATNNTGGGTTTCCGNATACCGCCCNCACTCACGCACCAATTGCTCACCCNC
GGCCTGAACNAACTGGTCGGTNCNCTNCCCGCCCCATCCNCTGGTTNAAACNGGCCNATTCCTTN
ACCCCCAGCAACANCNAATAACCCGGACCTGGCCANCNCCGGGTNGCTCACCCGGGCATTAAAC
TGCATTTTCAAAATATNNCCGGTTGGCCACGCCCGTNAGGTTGTCCTGNTAGGATCCNACCCCCA
NTTTCNCTNTGCCCCTNGGNCTGNTCNNGGAANNGNNCCNTGAGCTTTCTCGACCATCTGGTTTC
TTNCTCNTGCNCCCACTCNCGNNNCAAGTTTTAAGGTNTTNNCTCCGGGNAATCCTCTNNGGCNA
NNNCTTNAACTGNAAACTTCCNCCGAACNGGGNCCTAANANTAGNCCTATNNGGGGNNACNNGCG
TTGNCCAACCNAACTNTTTTTTCCCAGCCGCGGGGCTNTTCAAGTCNTTGAACGNAACTCCT
CNNGTCNTTCCACANGGNCTCCCCCCTANTNTNTAACCGCGTNTCNTCTATNTTGGGNGTCCCCGN
NTNCATACATGNCNGAGTANAAGAAGCTCNANCCTCCCNANNNGGNTCTCCGCCCCCCAATTTNT
CCCCTCTCTCCCTTTTNANCNTCTAAATATATTCTTTNNTGGGNNTNAANAAGGGGGGCGCANAAA
NACCTNTCTCCGGGGGGGGTTGTGGGNCCTNNANAAACCCCCCTTTCTNTTNTNNNCCCCCCTCCG
NGGGGGCTCCNCCCTCCCTNTTTGTTTTCCCCNCCTANNAATCCCTACTCNCNGGNCTAGTTGAA
AAAACANNAACGC

09673605 .123101

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scd-21 **SEQ ID NO: 7**

```
NCAANNCAGATCCTGNAAAACCGGAAAGGTTCCNTTCAGGTACCCTACTTGTG
TATAAAAGTCAGGCCCCCAAACGCCCCAGGTGCAACAACTGGTCNAAGGCTACN
TGGCCCGGTTACAACCCTGCGCTCGGTCNAACGCAACCCCAAAGGCCCTGCCCNA
ACAATGTGCCAGCNAATGGGTACGGCCGATCACCGCCCCTGGACCTGGTCAAG
TTGACCCGCCCGGCTGTTCGTCGAAGGGGGCCCTCGGCCAGTTCGCCNANGCCC
TGGCCGGCGCGCAACCGCCCCCAGGCNACCCGCACTCGCCGGCACCCCGGTCAC
CGGTTTTCGCGGCCGCCGCAACCCGGCAGCAGCNTTTTGCCCTGAAACGCGGC
AACAATGCNTTGCGCCATCGGCANCNAACGCTCGTTCAATGGCCCGTTNCGAA
TNTTTGCTTGCCAAACCCCCCATTTTTCCCGTTGCGTTAGGCGGCATTCCTTTTC
TNACCANAAAGCACCTGAACCATTCCCCGGCAANCTTGGAAATTCTTGGCCCC
CNGNCCCTGCCAATTTTGCCNAAAAATCAANATCGGTTTCAACCANCCNCCTT
GCCTGGAACCAAACCCTCAAAAACTCCAAAAAAATTCCCCCTTNCCNCTTGCAA
TCNNTCNAAGAACCANCCCTTTTTTNCCAAGGNATTTTTTTTCCNANAAACNNC
AAANGTNTTTNTNAATTTTACNACTAAGGCCANTTNNAAAGTNCCCAATTTTT
TANNGTCCAATTTGNCCCNATTTTAAAGGCTCCGGTT
```

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>sad-10 **SEQ ID NO: 1**

GACCGCAGNAGAGCAACNGNCCGACGANCAGCAAGGACCAGAGNGGAAG
AACGCGGCGAACGCCAGCGGCGAACGCAGACNCCCCACNNGCGGGNATNNG
CGANNNGCCNCGCCNGNGGNNNTGNTTATNATNANCCTCCCCCCCGACGAA
GAAATTCCCGATGCATTGCTCGAGCGCGTAGGCCTGTCTCGGCACAAGGTCA
ACCACGTATTTCAGCAAAGTGCTCNAGGCGGAANTGCTGCTGCCGAACTCGC
CTCGCANTTCAGCCACGGCTGAATAGGCTCGCCCCGGTCATTTGATCTTTCCCAC
GCTCTGCCGTGGGAATGCATCCCGTGACGCTCTGCGTCACATCTCAGAAGCCGA
ACGCGGAGCCGTCCCTGGCGACNTTCCCNCNCAGCGACCGTGGCGAACCNANCA
AACNTGGTCCCCCTCGATTNTAAAGTTCTTCCTTAAAANCTTCTTNCGGGCTT
CCAGGGTATTTTGGTCCANCCCCCTTGGGAACCCANATCCCCCACGCCCCCCCG
CGTTGCCCCNTTTGATCCTGGGGATTCCGACTTTGTTCCTTGNAAATCCCCCCT
TCCATTGAAACCNCCCANGTTTNGCCTTTTTGTTTCCCTTTCGGCCCNTNCCAA
TCCGNTGNGGCAAAAACGCCCATTANGGGCNGGGCCCGTCCCCCCCCCCNCGN
NTGTTACTNAANTNCANAACCGCNNTTGGGCCANAAANNTCGNCTNGNGN
NNNNNCNNCGNCNTCTTTNCTNCCCNTCCNNNCTNTNNTCCTCNGTGTATNTC
CAANTCNTNCCNNCGCCCNTCCNGCCTCCCCACTNCCTNNGCCCTCCNNNCCNN
CCGCCCCGNNNCNNNGTCATCNNTGNCCGCTCTTCCNCCCNCCCTGTCCNCCCANT
GCCNNGNNNCTCCGAGGTCGCNGGTCTCNCCNCCNCCNGNTTCGTGCNCNGGCN
CNNGATCCCCGTTCNCNCCNGNCCNTNATGCTGACCAGTNNGNGNGNGNGTNGNN
NCCTCCCCGTCNGNACNTGTNTNGNGGGGGGGCCCNCCC

>sad-11 Match: clpP **SEQ ID NO: 2**

GGNGGGGNNGGGNCTTGTGTATAAATNTCAGCCTCTGACATCCAGGCCCGCAG
GCCGGCCTCGTTCCCNATCGTTATCGACCANTCCGCCCCGGGCNAANGTGCCTAT
NANATCTACTCNCGTCTGCTCAANGAACGCGTCATCTTTCTGGTGGGCCCCGGT
AAAAGACTACATGGCCNACCTGATCTGTGCGCAACTNTTGTTCCTTGAANCC
NAAAACCCGNACNAGGATATCCATCTCTATATCAACNCCCNGGTACTAGT
TCAACCCGTGAAAAAA

>sad-16 **SEQ ID NO: 3**

GCTNGTGTCTACCGNTCACCAANAATGCCGCCCGCCGACNACAACNCTTAATC
NGCTGAAANTCCATTCGATGATGCTCCACCCGTCCATCCNANCCTGGAAGCC
AGGATTNCTGCCCGACATNANGGTNCGGGTGGCAACAATCTCACCGNAACCT
GNNCCTGTGGTCACAANCGAGGTTCAGGTCACCACCGNCCGTCCCGGCACCCGT
TGCCCCCNCTGGTCAGGCCCGGCCCACGGNNCGGTNGCCCCCAGANGTCNATCCTCC
CTTTGACCCTNAANCNGACCCGGNCNATGCNTGGCNACCNTTGCNTTTGCCA
ATGGACCNCCGNGGACATNTTNCCGCCCCGCTATCCAGGGCNCNACCCAANAN
TACNGCCCCCGGCGTCCCTCTANNNTNTACTATTCNACGCGTCGGCANANNTGC
CCCTNGTNGGCTTNCCTTTCTCTTCCCCGNCNCCTNTTTTTCCCCNNNTTTTTT
GNCGCGNCCCNCTCTCNNTCCCTNCCTTCCNCNNNCCNTCGTCTNNNNCCCTNG
TGGCCTCNCCCCTTTNTCCTTCCTTCCNCNTTTNCTTCCCGTCGCCCCTNCTCTCTG

Fig. 9 **PAGE 4 OF 12**

NTTCCNCNCN-GTNGCCTCCGGTTANCCCAGCCTCCGTCTCCNCCCGCTCNNGCNCT
CTCNTTTCTTCGCTTCNTCTTCCCTGTGGCCCTNTGCCGATCNCNCNANCTTCTCCT
CGCTNNCGGTCNCANCCTTCNGTNTCCCGCNNCNCNCCNCNNCCTNCTCTNGCNCC
NNNNTCGTCTTCCGTNNNCNNGTNCTNNNNNCNNCAGTCNNGTGTNCNNNAGNT
TNNCGNAGTNTCNNATCCC

>sad-20 **SEQ ID NO: 6**
NCNNACGNNTNCNAAGTGATCAGGCCNATTAAACNNNTGACNAAANNAG
AACANCNNCGTCTGTTACTACTCTTCAAGACCAACCCAAGNCGACCGTCNA
TAGCGNGNCCTNTACCCAGCATCNGTTCCNCATTTAGATTNNTATCCATCCN
TAAGTTTCNCCGGGTCAGAACCNTNCTTGACGTACAACCCATANNGCGGGGT
ANNGCGNNATTTTNNGCTACCTCNCATGTTTTGCAAGNCCNANTNCCCNTT
AATNGGNAGCNNCANNCANGCNCNNGGGGATTATTACNACTCNACCCNTGG
ANAAACNTTGCCACTACNGCNGGNCCCCCCGCNCNGTCCNGGNCTCCCCTGCCCAC
TTCCCTTGTCTCCCCGNCCTCTNTNCCCCCCTTTTCNCGTCNNCTTCTGGTGTNCCN
TTCCCCTCCCCCCCNGTCCTCNTTCANCNNCTNCCGTCTNGCGCACCTNGNCCNNC
TCTTCCCTNCTGGCCCCTCTNNCCCCCNTTCGTTNTANCCCCTCTCTCNACNTNC
TTCATCCCCGTCCCTNTTCTTNCTCTCCNCTCNCCNCCCTNTCCTANTCCTNTCGT
CCCNCTNCCNTCNTCGTCTNCCTNCNCCNCTTNTCGACTTCNNCNTGTTGNCCC
NCCCGCNGNCNCTTCTCTNGTCTTCTCCCCGTCNGCNGCTCAGNNCCCNTCCTTCC
NTTNCTNCTNNCTGTCCGNCNGCCGNNCCTGTNCCTNCGNCCCCTAGNNNCGNC
GCGCCTCNGCNNCCTCGTCCCNNGNTNTNNTCTTTCTGCNCCGTGCTCNNTNTT
CNTNTNTCNNCTCGCCCATCCNCTNCCTCTNTNNNNCGTNGNTTCCNCTTCTA
GGNCCNNATTCCNANNNCNGGCCNTTNCCCC

>sad-22 **SEQ ID NO: 8**
GCCNNNNNCNCNATTATNCAAGNTCTAAGTGTTNNACCANATNCCAAGGAC
ATAATGACTTNCCTTTATTAANTGTCCGGACCATNCCATATNCAACCGTCC
ANACCGTNAACTTNACCCANCATGNCTCCGCNTGTCGTATTTATANNCCCCA
TAAGCTTCNCCCGTCAGAACGTTNCAATAGGTACANTNATACTGCNCGGCNC
ATGGCATTTTGGCTTTCTTTATGTTNGGNAGTTCNAACAGCCTTTTTATGGA
GCGTCCACAGCTATAGGGGGAAANTNCTATTCAACNCTGGCNAAANTTTGA
AAAACTNAGANCTTCNNNGGTNTATAGGGGTATCCCNTGACCAAANNCCN
CTAATTCCNACNCTTTGNTCCCACTTCCTCCCTNGCGCGNCTTTACCNNCNCCC
CCGTCCCTTCCCCNCNGNNCNTNCGNCACNCGCCGAAANGNNNTCNCCCCGTG
GTTTTCTCCCNGTCNTNGNNNNNCCTCGTCNNTCCCGCNNCCTTNCCCCCCNGT
TCCGAACTNTTCTCCCCTNCNCCCNCGCGNGTCCGTCTNNNTNNCCCNNCNTNC
NCNGGNTTNCNCNGCCNCCNTTTCCTCCCCCCCCCCCCTTANCCNCGANCCCTCTC
CCTNCCGCNTCGCCNCCCCCCCNCGNCCCTCCCCTNTNCCCTCGGNGNCNCNCCNC
GCNCTCCTTNNCNTTCGCCTCCTCCNNCCNTCNNCTCCNCTCNTNCCNNTCCCNN
CCCTCNTNNNTCCCCCNTGCCCNNNNCNCCGCCCNTTCGNTCCTCNNNNNNNNTN
CCTGNGCCCCGCGTGCNCNGNGCCNCCCCCTNTCCTGCCTGTCNCCCCCCCCTNCCC

Fig. 9 PAGE 5 OF 12

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>sad-51 **SEQ ID NO: 9**

TATTTGTGTATAAGNTCACCCCCAGCAGTGACCGATGTCACCGATACCATCG
ACACCAGCACCCGTTTCGCTCACACCGACTTCCGACCGTGCCCCGAACGGTGGACT
GTCGTTTACACCCGCCTCGGTTAACCCACCCCGTGACCCACGCTCCCGTTGGTTATC
ACCCTGTTCCAAACGGCCANACCATGNCCATTCCCGGTTGGNGCCAGCANCNGC
ACCGTGAACTTTCGTGACACCAAACGACGCCCTCGCCGCCCCGCGATAACCTCAG
CGTGAAGATTGATGACGCCAAGGGTGGCAATTACNAAAAAACTGGACATCG
ACGCCACCCCCGCCGGACACCACCGTTACCGATNTCCAGGACACTACCCGCCCTC
ACCTTGANTCGCAACCGATAGCGTTGCTGAANGCGGNTCGATCGTTTACACCG
CAACATTGACCAACGCCNCCCGGNTCGCCTGTCNCTGTNACCCTGAACAACNG
NGCCGTGATCAACATCCCTGCGGGNGTTTCCCCCCCCCGTNCTANTCTACACCNG
NGAAAAA

>sad-52 **SEQ ID NO: 10**

TGATTGTGTATAAGATCAGCCAGCAAGGCGCCGTCGTCGGGTTGGTAAAGCC
CCACCAGCAACTTGGCCAGGGAACTCTTGCCCGAGCCCGCTGCGGCCAATGATG
CCNATTTTTCTCGCCCCGGCTTGANCACCAGGTTNATATTCTACACCTNGGGNTT
CTGCTGGTTCGGANAAATNAAANTTCAACTNANNGNATTCCAACGGCCCCT
TCCAGAACTTTCNGGTCANGGGGNGCTCNTCCAAATTGCGCTCTTGGGGCAGC
TCCNTCATCTCGGTCCANAGANATCTTGGTCACCCCCCCCTGTTGGTATCGGGTC
NTCANGCCCNACAACNAAACCAACNGGCTGAGGCGCGACCGCTGAACATN
TNTCANGCGACCANCCCACCCNTGCTCANGCNACCGGCGATNATCAAGTNTA
CNCCNAAAANAANATGACCACCCCNGCCAGTTNCTGGATCAACAAAGTGA
TGTTCTTTGCCNGGCCCGGANAACATCTTCACCCCCANTTCTAAGCGGCTGAAG
GTGCCGATAGTCTGTTCCCNCTGGTATTGGCGTNCCNCCCCCCNTACTANTCA
ACNCNTGGNAAAAAAA

Fig. 9

>sad-53 **SEQ ID NO: 11**
CTGGGTGTATAAGATCAGCCCCANTNGTGTCCTGGAGTGTCTGTNACACTGG
TTTCGGCANGCTTGCCCTCNANATNCANTTTTTCGTAATTGCCACCCTATGGC
CTNCTCCNAAATTTGAANCACNAGNNACCTNCCCANTGNCAAGGCCTTCTTCN
GCNTCNNGAAATTCANCCNACNNNAAATNCGGCCAACCCTGANTGGTTACC
GTCNTGCCGGCNCCCNCTCNGCNCATTTCTCTGCCNAAGCNTCCCGGTNCCTNCN
TTGCCTTCTAACCCANGCCGNCNGNTNTNNANCNNCCTTGTTTCNCCCCTNCNG
NCCNACGGCTCCAANGGTTTTNCCCCCNTAGGGGCCTCNNTTNTTTCTAAAN
CGCTTTTCCAGAAAAAGGCCTGCCCGGTNTACNCCTTCTTANNTNTCGTCCCG
TCCNAGNCCTTATCNCTCTCTNNCCCCTTCGGATACTNCTCTCTAAGTTTCCCT
AAAATCNNCTGGNTNGGNTTCTNNCNANAAAGAANATCTNTGGGGCCTTT
NTNTNTTATATCCTCTCNTATTGTNCTTTNCNNTANCNTCTNTCCNNGANNC
TCATTCCCCGANACCCTCTNNNNNCCCGCCTTNCNCTCTCNTATANTTTCTNAGT
TGAACCGCTCNTCCCNCTNCACTNTTATTNNNNTNNGCGGGNCCGNCNCTTTGT
CCCTCNTTAACCCTGCCGNTNGCGAGCNTACNGGCTCNCTCCCTAATNCTCTG
GGCGGTNNNNGGGGCCNACGTCCTCGCCTTCGTTCNNAAATNNTTCNTAANTT
CCAACNTCCNGCNGCCCCGCTCCGGNNNNNNNCAATNTTNTCTCCCCCCTATTCT
NGCTACNCAGCCGNGTGATNATCCCNTTCTCANNAGCCTNTTCNGGGTATAAC
NGNGNAGNGANNCTCTCTCTTTAGTNCCNNAANCCNATCTCTNCTCCTCTTC
TTCNGGTCGCGCTNCTANANCNCTGGTCAGTTNNNTCCTCNATGNNNCNNAG.
GNTCCCNNNTTNCTCNCTCNCTTCTTGNNNACTCCCNGTNTGTCCNGGANTGGN
TCTTCCGCCTCGGNANCNNTGCTCCTNTNTTCNCNANNCGAANANTCTCCTTN
CTAACACNCCTTCGCCNAANACNTTTTNACTCTNCCCTCNTCCTTCNCTNNCT
CGTCTNATTNTNANTTNCNTNCCTANNCNGTGACTCGTTAGCNCTCCGNTCT
TTCCNANTCTTCGCCCCCNTCTCCNCNCTCNANNCTATCCC

>sad-57 **SEQ ID NO: 12**
TNATTGTGTATAAGNTCAGGACTAGAGNTCCTCTCTTAGTNACGGTTCGCA
GCGTTTTTGCACCGCATCGTCCANTGCGTNCCCCACCCCGTACTAGTCGACACGT
GGANAAACTCGCCCGGAGTCGACNCGTGGGTANTAGTCGAAGCGTGGNGAN
GGNTCNCGNTATNAGGCNTAANANCTGCATCACGAAAGCNGGGGAAGGTT
CTCNAAAANTTCNCCNATGAGGGAGAACACGGAAANCCCTTTACCNCAGGG
GCGGCCCNGAAATCTGGCAACNGANCGGNNGGAGAATCNNCCATTTCGTCAG
CTCCATGGGCACCACCGGGAACATCATGGCGTCNNNTNCCNGTACTANTCG
ACCGTGCCCAA

Fig. 9

>sad-58 **SEQ ID NO: 13**

TGACTGTGTGTTATAAGNTCAGNCGGCACNTGGNAGTCCNCNTNTGGTTCGTA
NGATCCCGCANCNATTAACCTGCCCNNGGGAAANTCNGGTTCAACCCCGNTCCN
CNCAATCANNCNNTATTTCACTCNCCCGGCCGTNCACNCCTNNGTANTANTCG
ACCCNTGGNCANTANTANTCTACANNNTGGTCAAAACNTTTCGANNNNGTA
GGNCNCCCCCTNTNTANANGTNANCTTCGTNACCGGGGAGGAAAANCCTCC
CCGGNGGCCANNNCCCCAGCCTAAAAAANGAGGCANGTANGGGTGNGAAA
AAANAATANCTNGATANGACNCCACCCNNTTTGACGCCAATTAACCGANG
TACANGACCCNGNCNAACTCATTTTNAGTGTNCCGACACGAAATTTTNANG
GNCGGNCCANGNCAANCCNTCTCNANGGTTTNGNAAANNNAAACNAGCCC
CTCCNNNTAAATGGTCGACCCCGCGGNNAANNTTNNCCNCCGANTGGGGTTTTGA
AATTACTTTTCAACAATCTTCAAAACNTCCGGGTCNANCCAGGAGGGCNCA
AAAAAAAAATNTTTTCCGNGTNGCCNNAAAAAATATCCNAAATTTTNTCN
CCCCCCCCCCCNCCNNAAAAGAAGGGNGGGGGGAAGCGGAAAAACGGGGGA
ANGAGGCGCGGCGAACGGGGGG

>sad-62 **SEQ ID NO: 14**

GTGCTTGTGTATAAGNTCAGNCCCTGGCCTGNGCCNCNACAACTCCGGTNNCC
GTCTACANTTTAGCNAAGGATCGGTCATTGCCTNGTCTNCTCGGNTANACTNC
CGGCACNATCCACCTCAATACTCCNNCCATTNACGTCTATGGTAACCNGGAG
GTCGGTCANCAGNNCNATTACCGGTNCTACCNGTGGAAACTTCGAAAATCT
NGTGGCNAACACCGGACCTGCGGTCCCCNCCANTTCCGATTCNGGNGANACN
NCATGGNTGTCNCNNACNGGNNGCNACNCCATTCCTGNANGGGNGCCAANTT
CCTTTCNCNTCAANCCGTNGGNAACGGGCCCNAATNCCGTNAACGTTACCNN
NGANAAATGGTCNGTTTTCCATTCCCCCCGGCGGNANAAACCGGGACNGAAG
ATTTCAANACCCCCCGCNTNTNATTNTACCNNGGGGNNNNGCGGGTCGNCCCCC
NCNNNACNNGTGANAANGGGGGGCTNTTCAAANTTCNTNGTGTTNANCAC
NACCCTGGCGTTTNATANTANTTNCANAATTNCGGGNGGAANACCACCCGG
GCTTNANNNCTTNNAACNGGNCNNNCNACCNNNCTTTCCNNNNNCGGGGGN
GTTCCNNCNNCCCCCCNTTNNNNTTNNTTTNNAAANNTTTTTGGGGGAAAAA
AA

Fig. 9 **PAGE 8 OF 12**

>sad-79 SEQ ID NO: 15

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TGCTTGTGTATAAGATCACGCCCCCGNCGCCNCCNNANTTANGTCTGGGTCAA
CGACACNNCATNCCTGCNGTGGNANCTCANTTTACNAGGCNCTTAAAANGC
ATNATTGTTATNCACTNNGNCGAGGTNGNTCCTCCCNTANCCGAAGNNATN
TGNNNACTTGGAANCATTTNANCNTTTTCCANTCGGTNGNTACCAGNNCTG
ANTCNTCANTTTCTGACACCCNCTGGTNNCNNTCCTGTTCACNCCTANANNN
GACCNCTCTCTCCCNTGNGGGCCTGGNCCNTAATATNNTACCGGCTTTNNAN
TGCTGTCAGTATNANTCTCCNNAGCNGNAAANTCNCTCTNCANNCGGTGTN
TNTNGTCTCNCNCTTCTCCTNCTCNTACACTCACTNACTNTNTNCTGNNAATC
NNTCTNNCTGTANTATCACGGNCANCNCGTTCTNTGTGGGCTCNCTTGANA
GGCTCCCCCCTNACCTCTCTANNNACNGTGTCGGGTATNNCNCTATAANAGTC
TTGTGCATGTNTCACAGTNACATCGTCGCCNNNCNCGNCTACCTCTGCATCNT
CGCCCTTTTNTTTCTNTTCTCTCNGCAAANATCTTNNTNTCTCTCNNTCNATC
ATTATTCNCANGCCNNGGGGTCTCCNTCCCCCCTCNNNNCNTCNGTTCNANAC
ANGTCNTNTTTAGCTATGTCTTATGTNCNCCTNTCANTTTTNCTNCNCTTCN
CACNCTTCAGANNGGCTNNGNCTGACCTCTATAGTCGNTCNTCTCCTCCCTCT
NCTNNTCTCTCNGCNATAACGGNCNTNCNCTTCTGGNCTCTCTCNNCCTCTCTNN
TNNTATATCCNNCGCCNNTTCTCTCTATCTCTCCCGNTNTGTGCTCNTCAATTG
TNCNCTCTCTCGTNCNNCTGTCNNNTCTANCGTNTTCTTGACTTNANNAATA
CNTACCTCTCTTNGCCTCTCTNCNTNTNCTCTCNCCCGCATCTCTNNGACCGCTN
CCTCTGCNCNGCCGCNATCTCTTCTTTNCGTTCTCCNNTTCTCGCCGNCTCTCTNNG
TACTNGCTTTTCCCNCTACCTNTCTCTTGCTCCTTCCTCGCNTCNTCTNCCTCTC
TCTTCTCTNTCTANGTCNNCNCGNCCATNGGCTTTCTCTCGCTNCNTNTCNCTC
TTCTNTCTNTNCCGTCTCGTCTNGATCNNTCTCTCATCATNTNCTNTNTTNTC
ATCANGCTNTNTGNCACTCTCCNATCTGTNTCTCTNTCTTANTNNTCCNTCCT
TCCTNTTCTCTTANCTCNCGTNNATNNCNTTCTCTGATNTCCTCNAGTATNTC
TATGTACGCTNNCNTTNATCCNGNNCCTNTCTCTATCANCATCATNCTAGCT
NNCTTCCTATNGTCGTGCTCTCACTNTTTCTGCCNANATATNNATCNCTNCTC
TNTATCTTCNTANATTNNTNCCTNTNAATGTTTNANAAATGCTCTACTCNAN
CTCTCNTNTCTTNNNCTCCAGNTCACTCTCTANANNTCCCTNNCGTTATACG
NTCTTNTNCGCTTTANTGCGTNTNCTATCANTNNCGCTCTTTTNTTCTCNTCT
CNCCNTGTNCTTNNCACACTNTCTTCATCTCTTCTCNNATATNNATGTCNNT
CTATNNCCNCTTCTATGCTNTCNCCTNTCNANCCACANTNTNNTCTC
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Fig. 9 **PAGE 9 OF 12**

>sad-80 **SEQ ID NO: 16**
TNCTTGTGTATAAGATCACGCCCTATNGCCCGNCTGNCGNTTNTCTGCGGTCCNC
GACCGCCATTCGAAAAAANCAGCTCCGNNACCNGTTCCAANTACACNNNG
TTGTNCNNCCCGNAGTTCCACCTTCNGCCTCGCCNACGTNNACAATTCCTNCNA
AACCCTCCGTGTGNTNTTCCNNNAGCTNATGTANGANNGTCNATNCGNCTG
NNNGNACTGTCNTACCNAGNCNCANGTNGGCACCAACCNGAGCNTCATTCNC
GCNNACNNCCGAACCCCGNGNGNATCGCTTCTNTCCNAACNCCNNCAANTCCA
ACNCCATNGGTTGTGTTGNCNACGACNNGNGCGAAAACNNCCGCNCACNNNG
NCCNAGTCAAGTTCCCCGCATACCCACAGCNCGTCNGGGGGTNTCNCCCCCCTNT
CNTGTTCCAAACATNNCCATANAANNNNNNGGTNTGCTGGGGGAATCCAAN
CCNTCNNCTCNGGTTCGATCNAAACAANATANCGGTCAANGGNCNGCCACT
TGCNTNATNAATTTCNNCAGTGCCCNTNNCTNNCTGATNNGCNAAGCCNNC
NNNCGGTTGCNGGGCCGNNNTTNCCCNNNTATNAANTANAAACGGCNGNTCC
NTTNNCNNCCANGGGTGNTTGNNGNTTTTNNAAAACNNCTTTTNNNNAAAN
ANCCCCCCCNCCTNTTTNCCNNGGANNANNATCCNNAAANNNNGTTCCNNCCC
C

>sad-81 **SEQ ID NO: 17**
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TCTGGGTCGNCCTACACNNCANNGGNNACTGCCAGCTCGGTNACCGCTACCTN
ANAACGCTTCANTGTTCCTCAGCNGGTCCACGTCCAGCCTTGAGCCACATGTN
AAAANNCNGCCNACAANCCNNGGNGTNAANNTCCACGNNNTGCNCGACGA
NTGCCAATNNAANNTTCTCNACNGTTTCACCTGGAANGACCTTGCCGANAC
CNANACNNTCACCAANGGTGAANNCAACTCCCGGNAGATNCGCTNCACNCC
NGACCCCCAACGAATCCTNCGCCGNNGGTTTTNTTAGCANCATCGNCGNCANC
AACCANGNCCANTTCNCCCCGNTNTCATTCCNNCCNANCCGACGGNNNNTCTG
GGCGTCNCCCCCCCCCGTACTANTCTACNCNTNNCAAAAA

>sad-89 **SEQ ID NO: 20**
TNATTTGTGTATAAGTTCAGGTTGCTNGNTGNACGCCATCCCGGCCAAGGGT
TGCCCGGCGTCACCCACATNGTACTAGTCNNCGCGTGGCCNAAACGGTGANGTC
TNCTAATTGATGCTTGCCAACGNTTNAAAAAAAAGTATNGACAGGGTNTT
AACCATCAGNTTNTNCCNAAANGTACTAGTCTACCCGTGGCCANANAANT
NNANNNNTGGNCA

Fig. 9 **PAGE 10 OF 12**

>sad-83 **SEQ ID NO: 18**

TNCTTGTGTATAACNTCAGGNTCTNAGATGAGCTCGGTACTTCANGAGNTT
TTCTGCGACCGCCGNNNCCGACGNCTGNAATCGNTGGNAGGTNNGCNTANAC
ANNNNAAAACTANNCCCCTCGAANCGNTCNNTGACCTCCTGNTCCAAATNGT
CACGNGCATTGGNCGACGGNNGCNCACCCNNCACTTCGCTCCGACNTCCCAAAA
NCNGCCTGGGCCNNCGNCGNCNGGATINNGCCCGACATCNNCTNANCAAANT
NCCCCNCCGGNTACTNGNCCANCCTTGACCANNTTTTGCNCTCCCTNTCCTTACT
CGGTCNGCTTCCGNTCCCCGGNTTGCTNACCANNATGGTCCNAANCCTGCTGTCC
TNCACTCTCAAATNCGCCCCCCGGCCAACCNTGCTGATCGNCTTCNNCNCCCNA
GTNCTATTCAACCCCCTGCCCAAA

>sad-87 **SEQ ID NO: 19**

CTTTGTTGTATAACNATCAGACACTAGAGCTTGCCCCTTCTNCANCNCTTCN
ATGGACAGCGGCTTTCCGGCCGTCGAGCAACGATCTGTCCACAGTNNANCAC
CANNAGGCGNTCCACCATCAANAGAAAGGANNCNCGGTNCNTNACCACNN
ACACANGTCTTGTTATCNACCACGGCAGCCAAGCGNTGTTTCAAACGTTCTT
CAGCNGTGTTGTCCATGGATCTGGTTGGTTCGTCCAANAACAAGATAGCCGT
GTTNANCNCCNTNCNACTNGACACGTGGAAATTNTNGCTCTAACCNCCCGAC
ANGTTCTGTCNNCNCTCNCCNAATNNNAATTCATAACCTTNCNGATGCCNGC
GGGCAAATTCATNCNCNCCCGCCANTTCACGGNCTGGAACACANTTCAACTN
CNACGTTTCNGGCGCCNAAAANTCTTGTTGTCNCCCAGGNTTTNNNNANCAN
CNNGATNTTNTTGGGGNNCCTTNCCNAANTTNTTNNNCNNCTCCCNTNANN
TTGAANNTNGNNGGATGTTNA

>sad-98 **SEQ ID NO: 21**

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GGCTCCTGCAAGCTGNCGGCGNANATCCNGCGCTNCCTCTTNNTGCNTCTCAA
ATGCATTNCCCCTCNATGAGTCGGCTGTCTTCANCGTTNGGNTGGTTNCAAC
ATCCATCANCTTGNTCTCCNCTGTTACCCCNGCNGTNNCCTGCCGCCCTCTCAG
ACCNGGATNCCCGTNCANCACCCCCTAGTTCTAANAACGTACCANGAANAA
NGAACACCCCCCTCGCGGGTGGGCCTACTTCACCTATCCTGCCCCGGCTGACGCCG
TTGGATACACCAACGAAAGTCTACACNAACCCTTTGGCAAAATCCTGTNTA
TCGTGCGAAAAANGATGGATATACCGAAAAAATCGCTATANTGACCCCNA
NTCANGGTTNTTGCAACGGAAAANCNCTNCTTCCCTGCTGTTTTGTGGAATA
TCTACCGACTGGANACAGGCCAATGCATGAAATTACTGAACTGAACGGAC
AAGCAAAAAACCATCCAANNAACTNCACCAACNANCTGGCCCGAGTNGGTT
TNAATCCCCGCCCCCGCCCAAAAAACGCCNGCATTAANNAANGCNGGTTGTT
TCTNTTNCTCGNNNAAANAAAA

Fig. 9 PAGE 11 OF 12

>sad-100 **SEQ ID NO: 22**

TATTGTGTATAAGATCAGNCCAGCNGTCGTCNTACAGNTGGGACAGGCCGGC
GTCGCAAGCTTCCCCTCGAGTGNTGNTCCAGNNATANCGAGNCNTGNGTGTT
ATAAACAAANCACCGNNATCGTATAACNCCGTTCGTGACCGNCGTATCGCCA
NATCTNNAATNCCGNAAACGGGTNGAAATCCCGTAATCCAAGTGTTATCNT
GCNCGGCGATCGTTCTAGAGCAACTCCATCATCTNTACAANCTTGTTCGANCTT
GTCATGGCACCTCCNCTGAGACAACGGTGTNCTCAATAGTCANCACNCCCCT
NNCCCCCNCGGGAGGANANTNTNTCNCTGGNNCCACNCNANCANCATCTTTAAC
GNATATTTCTTNTTTATCACCCCNNTTGGTTACCCNNTGCGTCATTGGCGTGG
NTGCAGCCGACAACNCCCCGAGAAANCNATTTNCTTGGNNGGCTCNTCNATC
ATCNGCACCCNCCCCCCAAATTGANAAGGTCGCCCCNCNCCNNGAGANACNNT
ANCCCANGTCCCCCNTCNNCANGTCCGTGGCGTCCCCCNCCCCGTNCTANTCNAC
CCTTNCCAGCNCCAA

>sad-101 **SEQ ID NO: 23**

TCTTTAANTAGNACCGACGANTCCTCCTANCACCCCTAACCAGTCNACGGCT
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NCTATTCAACGCTTCGCCAAACACGTGGTCANATCTCTCNCCAGTGCCCCTCN
TANCNTTCTCCGATACACTTNTCTTCTTCCAATATCCCCCGCTAATCCCCTCTC
ATCNGTGAANNGGCCCCGCTCCATTAAAAAGCATNGNGCNNACAAACAAC
CNGAGATCNTTCNNNTTNNCANNCCTCCCCNTCCCTCAAATTTCGNNAGGGG
NCCGGTTGCGACCCNAAACCGCNTCCNNGNGGNAAATTTCTTNCNTT

>sad-102 **SEQ ID NO: 24**

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CTCTCNGTCGGNGNNNCAGGCNATGCCCGTCATTGTCCATNNTGCNGACNACCC
TACTACTCTTNTGCNTGANCATGACTGCCGGCCCGANAAGTTGCGCATTGTC
ACCTAACCCTGGCCGCCTGTATGTCTNCNAAAANAACTGCAAGATGCTGGC
CTGGACTACNAAACCACGGCCATCGTGTTCAAGCNCCTGGGTNTCGACGTGG
AATGGCAGTTCCTGCCGTGGAANCGCTGCCTGGTGATGCTGGANCAGGGGTTG
GCGTACCGNNCCCNGTACNNTTNNACCCNTGNNNAAANCNATNCCNTGCNGC
TTTACCCCNNCNAANCNCTNTCNGACNTGGAATTTGTGATNTTCTACNCCNA
TGCCCNGCCCCATCCNTTTCGCNCNCNCNATAANCTGCGNGNCCCCNCCCCCGT
NNTANTCNACCNTGGNNAANAA

Fig. 9 **PAGE 12 OF 12**

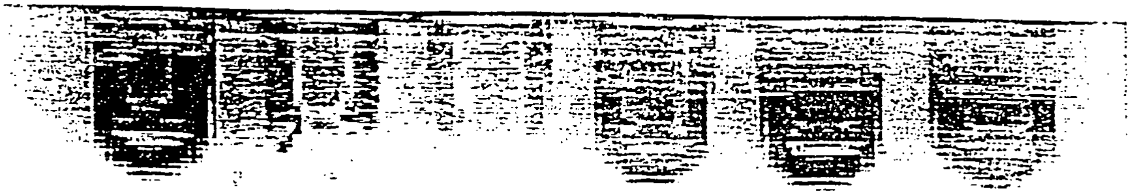
LB
glycerol minimal
glucose minimal
glycerol minimal & CAA
glucose minimal & CAA
minimal & CAA

Fig. 10

09/673605

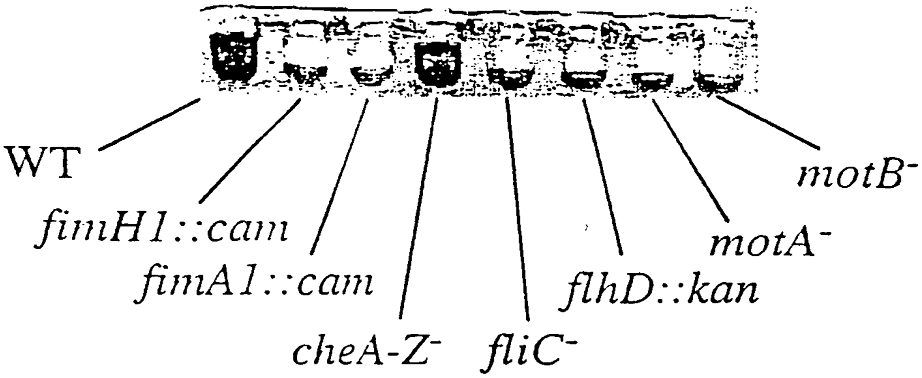
WT
fimH1::cam
fimA1::cam
cheA-Z⁻
fliC⁻
flhD::kan
motA⁻
motB⁻

Fig. 11

09673605 .120404

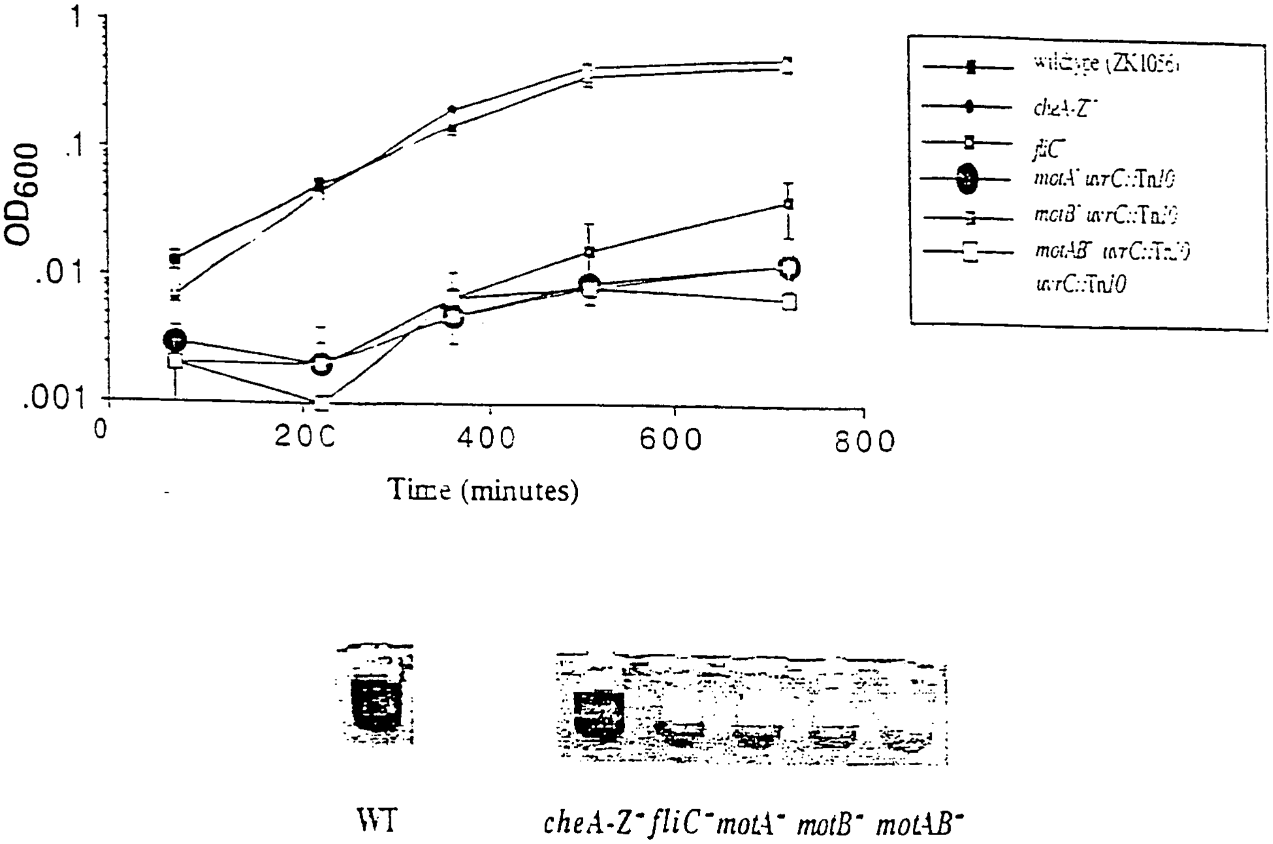
1
.1
.01
.001
OD600
0
200
400
600
800
Time (minutes)
wildtype (ZK1056)
cheA-Z-
fliC-
motA- uvrC::Tn10
motB- uvrC::Tn10
motAB- uvrC::Tn10
uvrC::Tn10
WT
cheA-Z- fliC- motA- motB- motAB-

Fig. 12

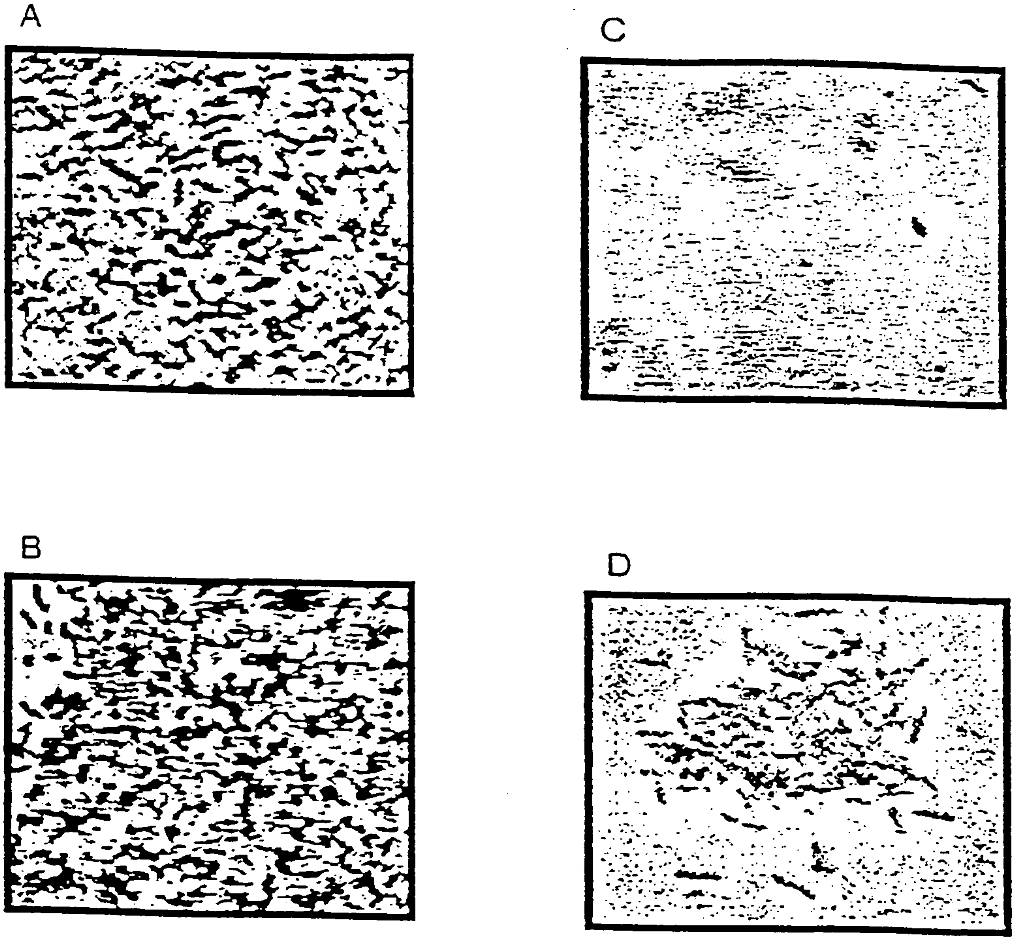

Fig. 13

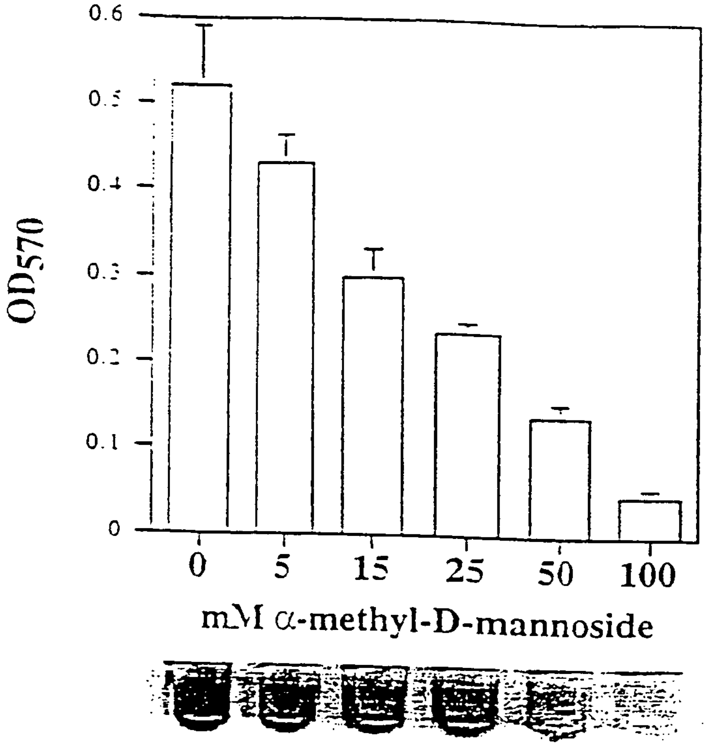

Fig. 14

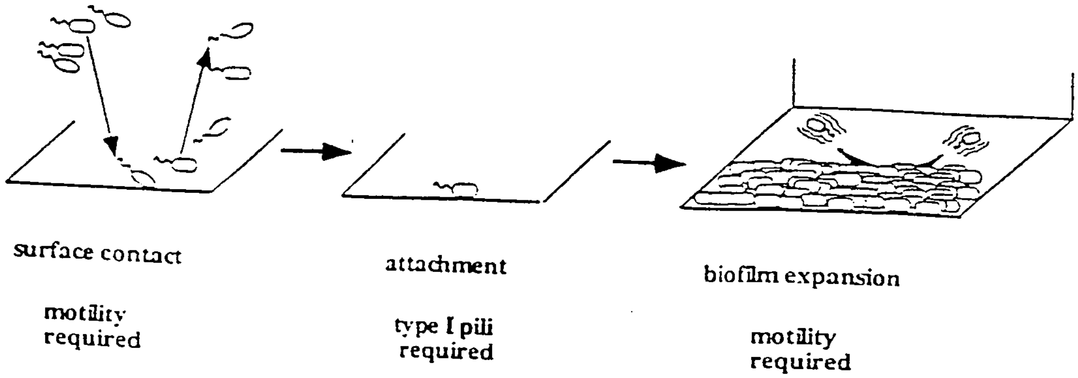
surface contact
motility required
attachment
type I pili required
biofilm expansion
motility required

Fig. 15

09673605 .102700

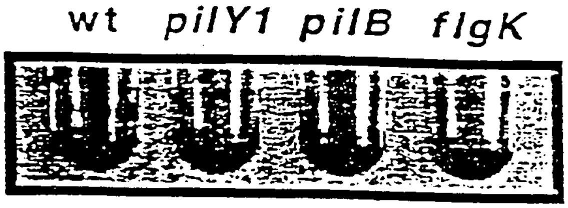
wt
pilY1
pilB
flgK

Fig. 16

09673605 . 122401

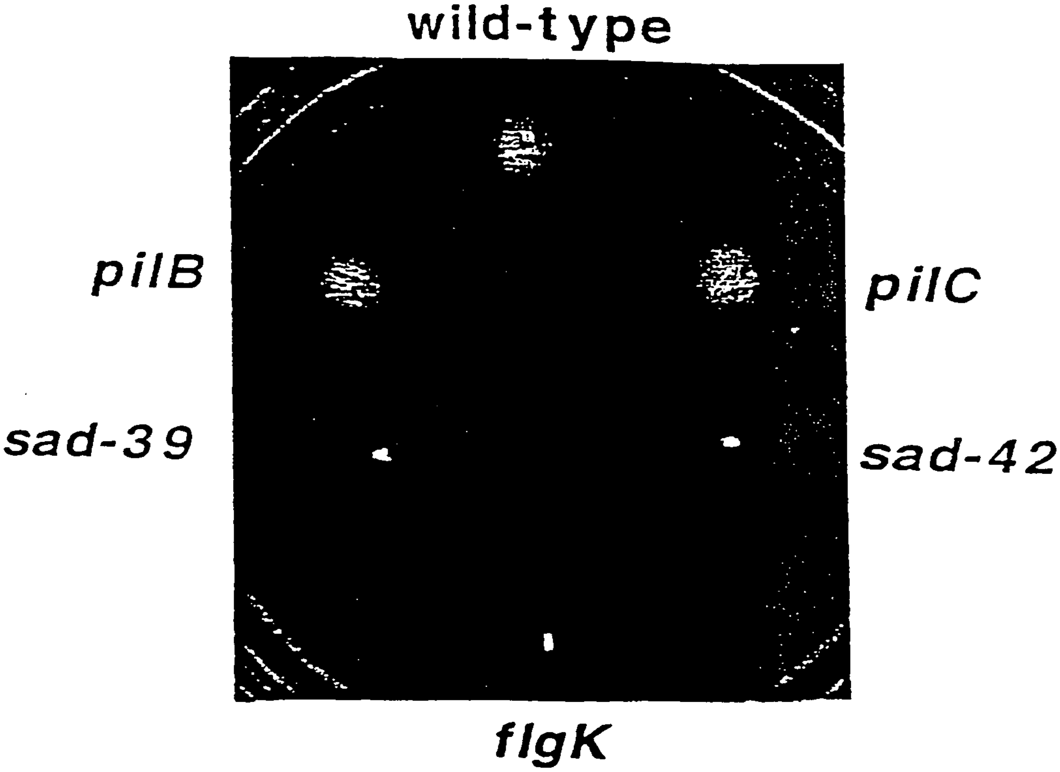
wild-type
pilB
pilC
sad-39
sad-42
flgK

Fig. 17

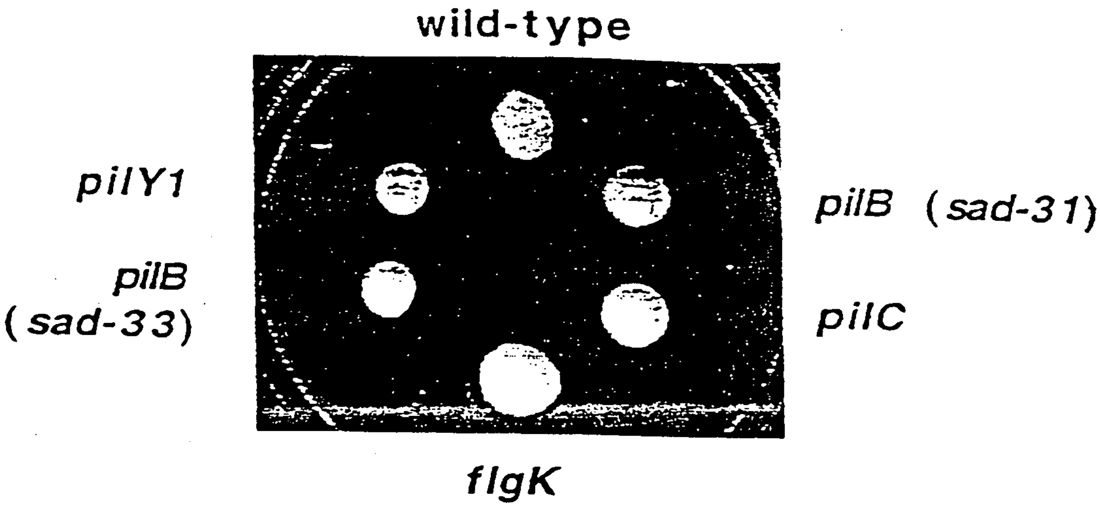
wild-type
pilY1
pilB (*sad-31*)
pilB (*sad-33*)
pilC
flgK

Fig. 18

09673605 .102401

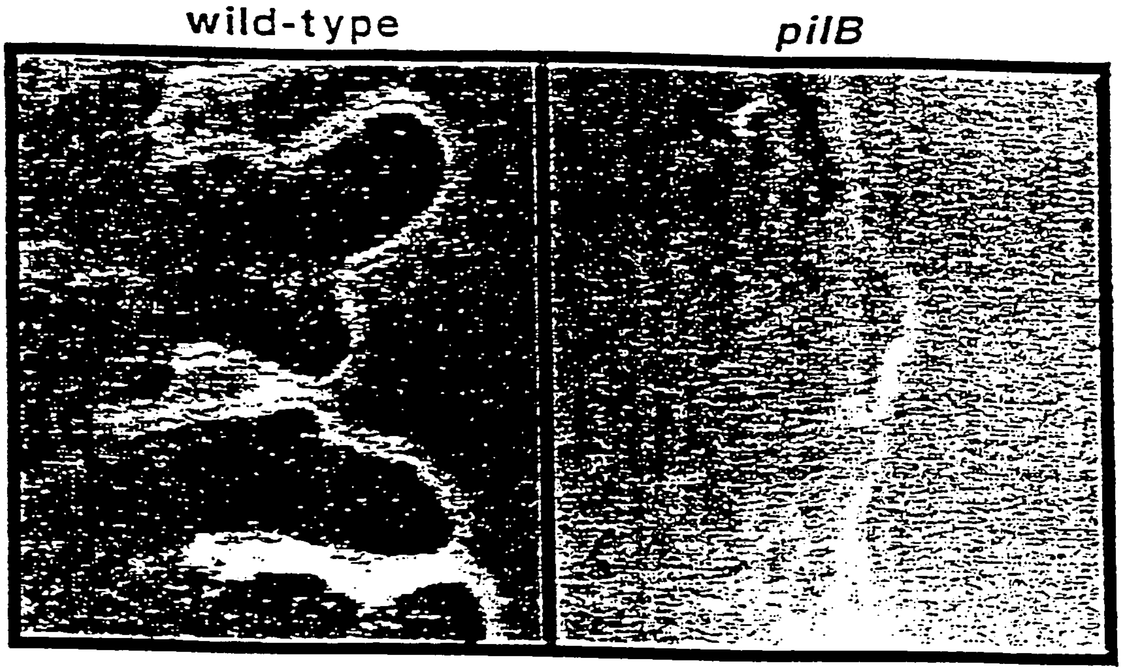
wild-type
pilB

Fig.19

09673605 .102401

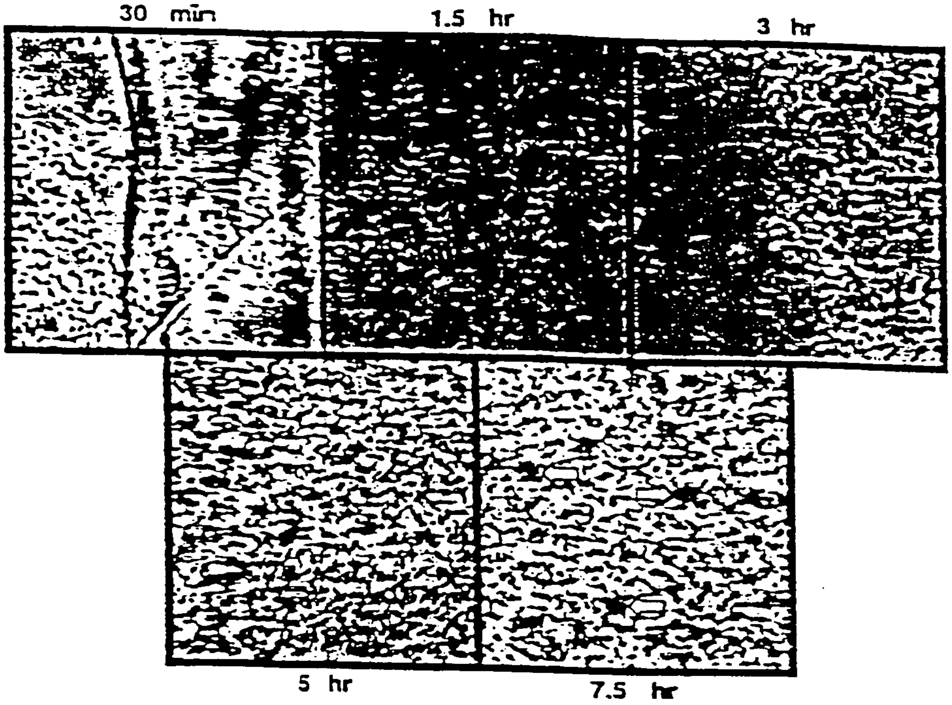
30 min
1.5 hr
3 hr
5 hr
7.5 hr

Fig. 20

09/673605

09673605 . 102401

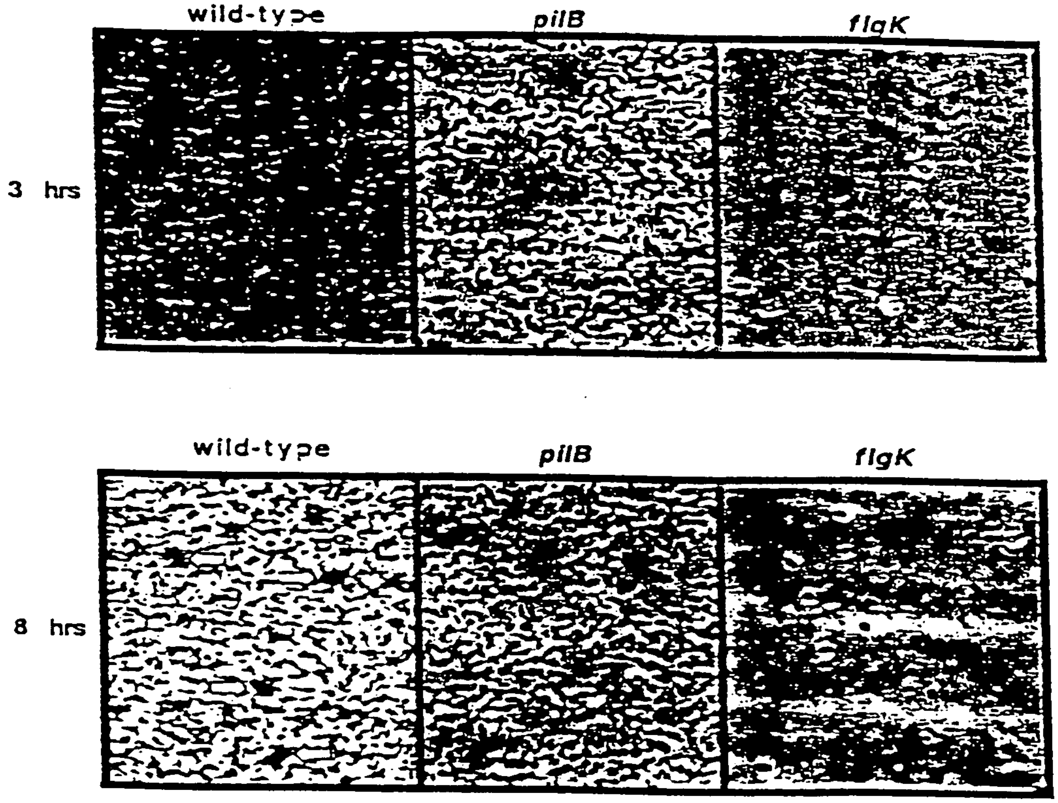
wild-type
pilB
flgK
3 hrs
wild-type
pilB
flgK
8 hrs

Fig. 21

09673605 . 122700

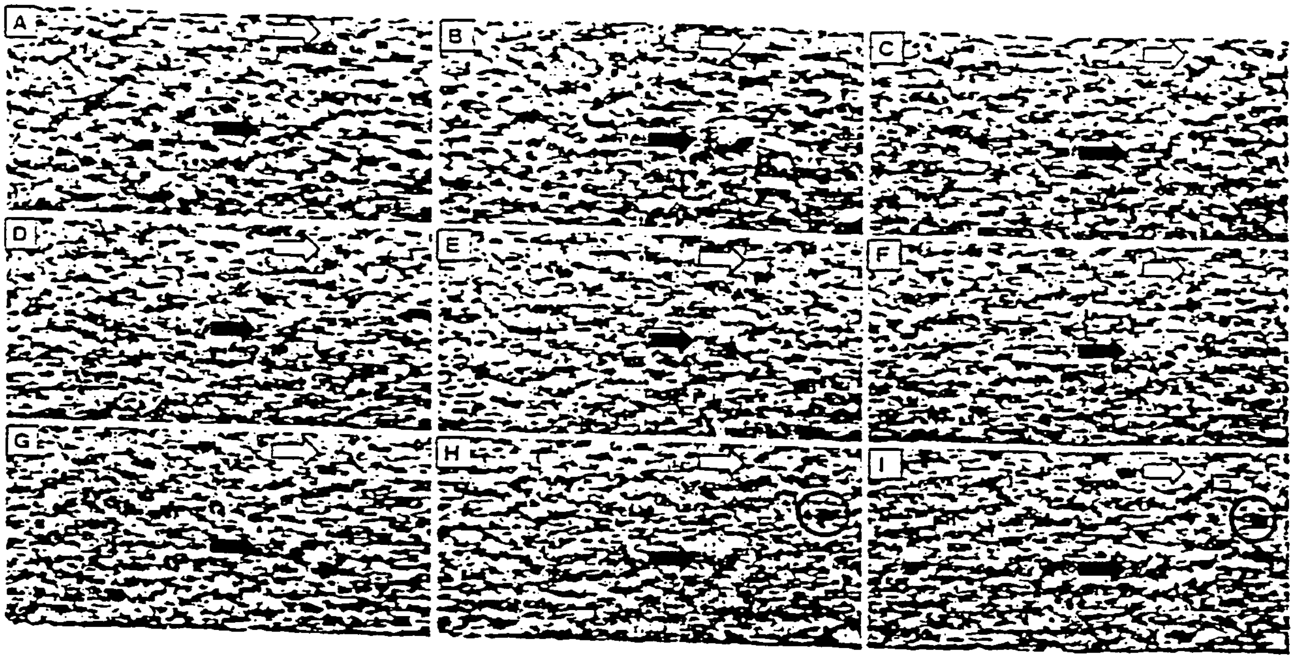

Fig. 22

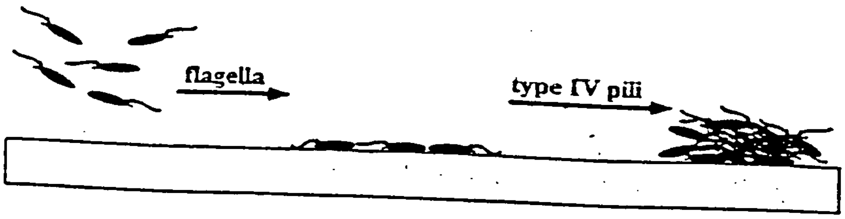
flagella
type IV pili

Fig. 23